Calendar No. 340

102D CONGRESS *1st Session*	SENATE	REPORT 102-226

MANUFACTURING STRATEGY ACT OF 1991

Mr. HOLLINGS, from the Committee on Commerce, Science, and Transportation, submitted the following

REPORT

OF THE

SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ON

S. 1330

NOVEMBER 21 (legislative day, NOVEMBER 20), 1991.—Ordered to be printed

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Mr. HOLLINGS, from the Committee on Commerce, Science, and Transportation, submitted the following

REPORT

[To accompany S. 1330]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 1330) to enhance the productivity, quality, and competitiveness of United States industry through the accelerated development and deployment of advanced manufacturing technologies, and for other purposes, having considered the same, reports favorably thereon with an amendment in the nature of a substitute and recommends that the bill as amended do pass.

PURPOSE OF THE BILL

The bill as reported amends the Stevenson-Wydler Technology Innovation Act of 1980 (Stevenson-Wydler Act) by adding a new title III which authorizes the Department of Commerce (DOC) to assist U.S. manufacturing through an Advanced Manufacturing Systems and Networking Project (Project), manufacturing fellowships, and a National Quality Laboratory (Laboratory). The reported bill also authorizes additional technology extension activities by DOC's National Institute of Standards and Technology (NIST); establishes a National Manufacturing Technology Advisory Commission (Commission); and requires annual reports on international negotiations potentially affecting Federal research and development (R&D) programs.

Background and Needs

Manufacturing remains a vital part of the U.S. economy, but the Nation is not improving manufacturing productivity and quality as fast as other major industrialized nations. Several problems limit U.S. competitiveness, including problems in the development and deployment of advanced manufacturing technology and techniques. While industry has the primary responsibility for modernizing manufacturing, DOC and other Federal agencies have long supported industry-led efforts to improve manufacturing technology, and now new opportunities exist by which the selective expansion and improved coordination of Federal efforts could promote significantly U.S. manufacturing competitiveness.

Importance and Current Condition of U.S. Manufacturing

Manufacturing is of great importance to the national welfare, accounting for 23 percent of the gross national product, 75 percent of all U.S. exports, and about 19 million jobs. The manufacturing sector also supports 92 percent of all industrial R&D in the United States.

Yet, while U.S. productivity in manufacturing remains the highest in the world, over the past two decades the rate of productivity growth has fallen behind that of other countries. In addition, many U.S. industries have lost world market share and are lagging behind their foreign competitors in the introduction of advanced manufacturing equipment and techniques. Manufacturing jobs still pay more than service positions, but U.S. manufacturing wages for younger workers, when adjusted for inflation, actually fell between 1973 and 1989.

In 1989 a study group at the Massachusetts Institute of Technology (MIT) reached two major conclusions about American manufacturing, and published these findings in a book entitled "Made in America: Regaining the Productive Edge." First, it concluded that manufacturing remains very important to the economy. It is unrealistic to expect that the United States can rely solely on services: exports of American services could never pay the cost of importing all manufactured goods; a loss of manufacturing industries would lead to the loss of related service sectors, such as engineering and insurance; and manufacturing is essential for national security. The book adds:

> The important question is not whether the United States will have a manufacturing industry but whether it will compete as a low-wage manufacturer or as a high-productivity producer. * * * [T]he best way for Americans to share in rising world prosperity is to retain on American soil those industries that have high and rapidly rising productivity. Manufacturing, and high-technology manufacturing in particular, belongs in this category.

Second, the MIT group found that six factors explain why U.S. manufacturing productivity and performance are not rising more quickly: outdated company strategies, short-term horizons, technological weaknesses in development and production, neglect of

human resources, failures of cooperation, and government and industry at cross-purposes.

THE FEDERAL ROLE IN MANUFACTURING TECHNOLOGY

While the primary responsibility for improving American manufacturing falls on private industry, the Federal Government has long supported the development of new manufcturing technologies in addition to taking other steps to promote strong manufacturing industries. Alexander Hamilton, while serving as the Nation's first Secretary of the Treasury, wrote his famous 1791 "Report on Manufactures," which led directly to Government policies to foster American manufacturing. Then, in 1797, the Government gave Eli Whitney a contract to make muskets using his new process of assembling products from interchangeable parts, a step which led to the American system of mass production. In 1901, Congress established the National Bureau of Standards—now NIST—and gave it the responsibility to assist "any scientific society, educational institution, firm, corporation, or individual within the United States engaged in manufcturing or other pursuits requiring the use of standards or standard measuring instruments" (from the original 1901 act).

During the 1980s and 1990s, DOC has assisted U.S. manufacturing technology in several ways. First, DOC's Technology Administration has worked to identify financial and other barriers to the widespread use of advanced manufacturing technology. In addition, NIST has worked with the Navy and private companies to develop new flexible computer-integrated manufacturing technology. That work at NIST's Advanced Manufacturing Research Facility (AMRF) was then used to create a pioneering plant to make spare parts for the Navy, the Rapid Acquisition of Manufactured Parts Project (RAMP). NIST also continued to provide precise measurement and quality assurance techniques for the full range of U.S. manufacturing and process industries, including electronics, materials processing, and chemical production. Also, under the Omnibus Trade and Competitiveness Act of 1988 (Public Law 100–418), NIST has both new technology extension programs to help small manufacturers adopt advanced equipment and an Advanced Technology Program (ATP) to help industry develop new generic technologies. Finally, through its Malcolm Baldrige National Quality Award Program, DOC has promoted actively the adoption of new quality management programs.

NEEDS AND OPPORTUNITIES IN MANUFACTURING TECHNOLOGY

The effective development and use of advanced manufacturing technology are increasingly important to U.S. industry. The best new inventions and products are of little value if companies cannot produce them quickly, cost-effectively, and with high quality.

In world trade, products are not introduced much more quickly than in the past, and many countries now possess the technical capabilities and skilled workforces needed to make advanced products. Increasingly, market shares, jobs, and profits will go to those companies and countries which excel in advanced manufacturing. In addition, world manufacturing is currently undergoing two revo-

lutions—a technological revolution, as computer-controlled production equipment becomes highly sophisticated and flexible; and an organizational revolution involving new quality management programs and the "lean production" system pioneered by the Japanese automobile industry.

In general, the United States is not moving as quickly as other nations to develop and adopt advanced manufacturing technologies and organizational techniques. For example, the February 1991 edition of American Machinist magazine published a survey ranking the United States 20th out of 22 industrialized countries—just ahead of Bulgaria and Yugoslavia—in per capita consumption of machine tools.

While the United States continues to conduct excellent basic research in manufacturing and while some U.S. companies have reached world standards in manufacturing, the United States has serious problems in three areas: the development of advanced manufacturing technologies; the widespread deployment and effective use of these technologies; and the effective adoption of new manufacturing practices. In all three areas, foreign governments have large, active efforts to assist their companies. In all three areas, existing DOC programs, in collaboration with the Department of Defense (DOD), could be coordinated and expanded in specific ways to provide much greater assistance to American manufacturing.

Technology development.—The nature of the next generation of advanced manufacturing technology is now becoming clear. For the manufacture of both metal products and other items such as electronics, the new technology will have three major features. First, it will be built around highly flexible computer-controlled equipment. The flexibility to make either small or large batches of products and to switch easily from making one product to another will allow firms to respond very quickly to customer orders and to changes in the market. The new equipment, if properly used, also will allow unprecedented product quality.

Computer communications networks also will become increasingly important. Factories will be linked electronically, and computer designs and even contract bids will be transmitted between customer firms and suppliers. At the Science Subcommittee's September 17, 1991, hearing on S. 1330, Dr. Paul Huray described how such a system would operate.

In addition, the new technology will require new voluntary industry standards, both to ensure that robots and computers from different vendors work together and to provide standard ways for computers to describe parts and products. National standards are particularly important in the United States, where parts suppliers and large manufacturers do not have the same close relationships as exist in Japan. In Japan, it does not matter as much if each large corporate group has its own standards, since parts suppliers sell most of their products to other members of the group. However, if American automobile parts companies, for example, want the freedom to bid on contracts from all three U.S. automakers, and the three automakers want all parts suppliers to have equipment compatible with theirs, then they need standardized computer languages. Industrywide technical standards are necessary in order for America's independent supplier firms and customer firms to work

together quickly, efficiently, and with a level of multienterprise integration equal to that of their foreign competitors. An important benefit of this multienterprise integration is that it will maintain the traditional independence and creativity of individual U.S. firms, while at the same time allowing American suppliers and customers to work together, when they so choose, with the same levels of cooperation and efficiency found in Japan's large vertically integrated industrial groups.

In part, the development of new U.S. manufacturing technology requires continued basic research in universities, government laboratories, and companies. The United States still has a research lead in areas such as artificial intelligence, sensor technology, and some aspects of computer-integrated manufacturing. Laboratory research in these areas will remain important and cannot be taken for granted.

The United States appears weaker, however, in turning these laboratory ideas and inventions into practical, integrated manufacturing systems. Three steps are required to accomplish this task. First, certain "support technologies" (sometimes called "infra-technologies") must be developed, particularly precise measurement methods, advanced sensors and in-process quality assurance techniques, and the underlying technical work needed to help industry develop new standards. NIST historically has been the Nation's chief laboratory for developing these support technologies.

Second, work is needed to develop new "generic" manufacturing technologies—that is, prototypes of new manufacturing equipment and systems that companies then can turn into finished products which will be used in a wide variety of applications. This work includes the development or refinement of specific pieces of new equipment, such as prototypes of the next generation of computers for controlling advanced machine tools. It also includes linking many pieces of advanced equipment under central computer control so that they work together as a successful overall production system.

Third, work is needed to develop the data processing and communications infrastructure needed in order to allow computer-integrated manufacturing systems at different sites to communicate with each other. This type of technology development work is best performed through "testbed" projects—engineering projects in which technical experts, equipment makers, and user companies work together to assemble, test, and demonstrate new systems. These projects evaluate and refine equipment, develop ways of making various pieces of equipment work together as a system, overcome technical difficulties, demonstrate systems, help create industry standards, and ensure that the resulting systems meet the needs of users. NIST has considerable experience at using testbed projects to develop new prototype systems as well as to develop needed support technologies. In addition, industrial consortia ("joint R&D ventures") are cost-effective mechanisms for further developing and testing new basic manufacturing systems, since companies can share costs and risks rather than each paying individually to perfect the new technology. One well-known testbed project, the Semiconductor Manufacturing Technology Project

(SEMATECH), is operated by a consortium and jointly funded by the participating companies and DOD.

Other countries have major government projects to help their industries develop and apply new advanced technologies for general manufacturing. Japan, for example, has proposed a $1 billion, 10-year government-industry Intelligent Manufacturing Systems Initiative (IMS). The Japanese appear very interested in acquiring the best American technologies and integrating them into their new advanced manufacturing systems.

The United States currently has no overall industry-led, government-assisted strategy for developing advanced technology for general manufacturing. The Nation does not necessarily need a single national project to match Japan's IMS initiative. However, a continuing Federal role appears appropriate because of the economic importance of advanced manufacturing technology and the "market failure" under which corporate executives and shareholders tend to underinvest in high-risk R&D on generic technologies because benefits will be long-term rather than immediate. In addition, selective expansion and more effective coordination of existing federally supported efforts, as well as improved coordination between Federal and private technology efforts, would help industry speed the development and application of these important new technologies.

Among those ongoing Federal and private efforts are the following: (1) the work of the Under Secretary of Commerce for Technology (Under Secretary), the Assistant Secretary of Commerce for Technology Policy, and others to identify technical and business barriers to the development and application of advanced manufacturing technologies; (2) NIST's continuing engineering work with the Navy and industry, through the AMRF and RAMP projects, to develop prototype flexible computer-integrated manufacturing systems; (3) related work by DOC, DOD, and an industry consortium to develop voluntary industry standards for the exchange of electronics parts descriptions, particularly the international standards-development effort known as Standard for Exchange of Product Model Data and the related U.S. effort known as PDES (Product Data Exchange); (4) technology development work by private industry consortia, such as the National Center for Manufacturing Sciences (NCMS); and (5) the Federal High-Performance Computing and Communications Initiative (HPCC). According to a report on the HPCC issued by the Federal Coordinating Council for Science, Engineering, and Technology, one of the three official goals of the computer initiative is to "[s]pur gains in U.S. productivity and industrial competitiveness by making high performance computing and networking technologies an integral part of the design and production process."

Given DOC's mission to support industrial technology and given its ongoing work in manufacturing, one option for improving the focus and coordination of Federal technology development efforts is to assign DOC, in close coordination with DOD, to support an expanded and coordinated testbed project in the field of advanced manufacturing technology. As appropriate, the project also would include related research. A national commission on manufacturing

technology also would help provide long-term guidance in this area to DOC and other agencies.

Technology deployment.—The United States continues to lag behind other major industrialized nations in the deployment, adoption, and use of current generations of advanced manufacturing technology. This is particularly true of the 360,000 U.S. manufacturing firms with fewer than 500 employees. In testimony before the Science Subcommittee, Mr. Leo Reddy, President of the National Coalition for Advanced Manufacturing (NACFAM), described the situation.

> In general, the rates of adoption by U.S. manufacturing of advanced production technologies have been remarkably low, particularly for state-of-the-art equipment. Since 1980, the average age of industrial equipment in U.S. factories has been increasing, to about eleven years old today, while the corresponding age of Japan's industrial equipment has remained virtually constant at close to seven years. Only 17 percent of U.S. manufacturing firms have acquired state-of-the-art programmable controllers and computer numerically-controlled machines.
>
> The failure to modernize is especially evident among small to medium-sized manufacturers (fewer than 500 employees). The relative productivity and earnings of these smaller firms have declined steadily through the 1980s. This is an acute problem for small and large companies alike, because large manufacturers increasingly rely upon outside suppliers for parts and components.

Capital costs and management practices largely account for the slow rate at which small U.S. manufacturers adopt advanced technology. However, a lack of credible technology information and assistance also appears to hinder small companies from taking the risk of buying new equipment. A Federal role in supporting State and industry-led technology assistance efforts is appropriate, first, because large companies often have little incentive to help modernize small firms with which they may have no long-term relationship and, second, because small firms often are reluctant to rely solely on the recommendations of companies selling advanced equipment.

The Japanese have dealt with a similar situation by establishing a system of 169 *kohsetsushi* centers throughout their country. These technology assistance centers focus on the needs of small firms and are jointly funded by the national and local governments at a level of $500 million per year.

Pursuant to the Omnibus Trade and Competitiveness Act of 1988, NIST operates two technology extension programs designed to help the States assist small manufacturers. NIST currently supports five Regional Centers for the Transfer of Manufacturing Technology (Manufacturing Technology Centers). The first three centers recently passed their third-year evaluations. NIST also operates a small State Technology Extension Program (STEP) to help State governments improve their technology assistance efforts. The States are paying increasing attention to modernizing their industries, as they recognize that keeping existing firms and factories

competitive is as important to long-term economic development and employment as attracting new plants. STEP also can serve as a catalyst which helps transfer Federal technology and expertise more effectively to companies in the various States.

While annual Japanese Government funding for their assistance centers totals $500 million, NIST funding for its two programs will total $16.3 million in fiscal year 1992. By comparison, the highly successful Federal agricultural extension service received $405 million during fiscal year 1991. Agriculture currently employs 2 percent of the U.S. workforce, while manufacturing employs 19 percent.

Manufacturing practices.—Japanese companies and a few American firms have pioneered the use of new manufacturing practices which greatly improve quality, reduce costs, and improve service to customers. These practices include: total quality management (especially the use of statistical quality control techniques throughout an entire organization); zero defects management (preventing product defects by planning and simulating new production processes before they are introduced); concurrent engineering (the simultaneous design of products and production processes in order to optimize product quality and process efficiency); lean production (an overall manufacturing strategy based on reducing layers of bureaucracy, using just-in-time inventory management, and cost-efficiency practices); and new R&D practices which speed the commercialization of new products.

In recent years, U.S. companies have shown great interest in adopting quality programs, as evidenced by the number of applications for the NIST-managed Malcolm Baldrige National Quality Award Program. However, currently no single forum exists whereby companies and private quality organizations, with assistance from NIST technical experts, can work voluntarily to harmonize and upgrade corporate quality programs, can exchange ideas on management and employee training issues, and can share best practices with a wide range of companies.

Given NIST's existing role in managing the Baldridge Award, it could serve as a center for such an forum. This forum could help both the manufacturing and service industries strengthen their quality programs. To support these activities, NIST could expand selectively its research and analysis work on quality and continue to provide technical services, including training. NIST also could help increase the number of trained manufacturing engineers in the country and of qualified manufacturing instructors in the Nation's 2-year technical colleges, in order to increase the number of engineers and technicians familiar with these advanced manufacturing practices and related technologies.

CONCLUSION

The reported bill recognizes the importance of manufacturing to the Nation's future, and also reflects the recognition that the Nation is not improving manufacturing productivity and quality sufficient to remain competitive globally. This competitiveness problem stems from difficulties in the development and deployment of advanced manufacturing technology and practices. The Federal

Government can play an important role in helping industry, including small- and medium-sized companies, to tackle these problems, in particular by building on existing Federal programs to promote technology competitiveness. The reported bill provides for such Federal efforts.

Legislative History

Senator Hollings introduced S. 1330 on June 19, 1991. Senators Gore, Bingaman, Nunn, Rockefeller, Kennedy, Dixon, Levin, Dodd, Shelby, Daschle, Lieberman, Riegle, Conrad, Wofford, Kerry, Bentsen, and Robb are cosponsors.

This session the Committee held three hearings which examined manufacturing technology issues and DOC programs: a March 20 Full Committee hearing on the Council on Competitiveness report, "Gaining New Ground"; a June 19 Full Committee hearing on the reauthorization of DOC technology programs and related issues concerning manufacturing; and a September 17 Science Subcommittee hearing on S. 1330.

On October 3, 1991, in open executive session the Committee considered an amendment in the nature of a substitute for S. 1330. The substitute amendment was approved, and S. 1330 as amended was ordered to be reported without objection.

Summary of Major Provisions

1. Section 2 states the findings and purpose of the bill. The purpose of the reported bill is to enhance DOC's ability to assist private industry efforts in manufacturing and to help ensure U.S. leadership in advanced manufacturing technologies.

2. Section 3 would amend the Stevenson-Wydler Act by adding a new title on manufacturing technology. The new title would set a national goal of being second to no other nation in manufacturing within 10 years; state that DOC is to be the lead civilian Federal agency for working with U.S. industry to develop and deploy advanced manufacturing technology and tehniques; create under existing NIST programs an Advanced Manufacturing Systems and Networking Project to develop new technologies; authorize and encourage other Federal agencies to support industry-led technology development projects; establish NIST manufacturing fellowships; and create a NIST-supervised National Quality Laboratory through which industry could develop quality management programs.

3. Section 4 would authorize additional activities by Manufacturing Technology Centers MTC's, authorize Satellite Manufacturing Centers, and expand the STEP program.

4. Section 5 would create a National Manufacturing Technology Advisory Commission.

5. Section 6 would require annual reports from the Secretary of Commerce (Secretary) on international negotiations potentially affecting Federal R&D programs.

6. Section 7 would authorize a set-aside of $45,000,000, for manufacturing, from funds which otherwise have been authorized in other acts for NIST in FY 1993; authorize $10,000,000 in FY 1993 as an addition to funds otherwise authorized in other acts for FY

1993 to cover NIST; and authorize $145,000,000 in FY 1994 and $125,000,000 in FY 1995 for NIST manufacturing activities.

7. Section 8 would make miscellaneous and conforming amendments to the Stevenson-Wydler Act.

Estimated Costs

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

U.S. Congress,
Congressional Budget Office,
Washington, DC, October 23, 1991.

Hon. Ernest F. Hollings,
Chairman, Committee on Commerce, Science, and Transportation, U.S. Senate, Washington, DC.

Dear Mr. Chairman: The Congressional Budget Office has prepared the attached cost estimate for S. 1330, the Manufacturing Strategy Act of 1991, as ordered reported by the Senate Committee on Commerce, Science, and Transportation on October 3, 1991.

Enactment of S. 1330 would not affect direct spending or receipts. Therefore, pay-as-you-go procedures would not apply to the bill.

If you wish further details on this estimate, we will be pleased to provide them.

Sincerely,

Robert D. Reischauer
Director.

CONGRESSIONAL BUDGET OFFICE—COST ESTIMATE

1. Bill number: S. 1330.

2. Bill title: Manufacturing Strategy Act of 1991.

3. Bill status: As ordered reported by the Senate Committee on Commerce, Science, and Transportation on October 3, 1991.

4. Bill purpose: S. 1330 would establish an Advanced manufacturing Systems and Networking Project at the National Institute of Standards and Technology (NIST). The bill would direct NIST to establish fellowships for graduate students seeking advanced degrees in manufacturing engineering and for industrial manufacturing executives to serve as instructors at community and technical colleges. It would establish a National Quality Laboratory to aid United States companies in working together to advance quality management programs.

S. 1330 also would permit NIST to contract with certain manufacturing technology centers to provide extension or transfer services in addition to their normal services. The bill would permit NIST to make awards to nonprofit organizations to enable those organizations to establish satellite manufacturing technology centers and provide additional outreach services. In addition, a State Technology Extension Program would be established within NIST to help states improve their planning and coordination of technology extension services.

Further, S. 1330 would establish a National Manufacturing Technology Advisory Commission to determine what steps must be taken to ensure a modern industrial infrastructure within the United States. Finally, the bill would require the Secretary of Commerce to provide the Congress with an annual report on international negotiations potentially affecting federal research and development programs.

5. Estimated cost to the Federal Government:

[By fiscal year, in millions of dollars]

	1992	1993	1994	1995	1996
Authorization levels:					
Specific authorizations		10	145	125	
Estimated Authorizations	5	5	5	5	5
Total estimated authorizations	5	15	150	130	5
Estimated outlays	4	13	119	132	34

The costs of this bill fall within budget function 370.

Basis of estimate: CBO assumes that the full amounts authorized will be appropriated prior to the beginning of each fiscal year. The bill includes specific authorizations for: the Advanced Manufacturing Systems and Networking Project ($50 million for fiscal year 1994 and $40 million for fiscal year 1995); fellowships for advanced studies in manufacturing engineering and for executives to serve as college instructors ($5 million for 1993. $30 million for 1994, and $30 million for 1995); the National Quality Laboratory ($5 million annually for 1993, 1994 and 1995); and contracts with manufacturing technology centers and awards to nonprofit organizations for satellite manufacturing technology centers ($60 million for 1994 and $50 million for 1995). In addition, based on information from the Department of Commerce, we estimate that the commission the bill would establish would result in costs to the federal government of $200,000 in fiscal year 1992 and $100,000 in fiscal year 1993; that the State Technology Extension Program would cost about $5 million annually; and that the required annual report would cost $100,000 in 1992 and less than $50,000 annually thereafter. Estimated outlays for these programs are based on historical spending patterns of similar programs.

The bill would direct that, of funds otherwise authorized for the Department of Commerce, $40 million be used for the Advanced Manufacturing Systems and Networking Projects and $5 million for satellite manufacturing technology centers.

6. Pay-as-you-go considerations: The Budget Enforcement Act of 1990 sets up pay-as-you-go procedures for legislation affecting direct spending or receipts through 1995. CBO estimates that enactment of S. 1330 would not affect direct spending or receipts. Therefore, pay-as-you-go procedures would not apply to the bill.

7. Estimated cost to State and local governments: None.

8. Estimate comparison: None.

9. Previous CBO estimate: None.

10. Estimate prepared by: John Webb.

11. Estimate approved by: C.G. Nuckols, for James L. Blum, Assistant Director for Budget Analysis.

Regulatory Impact Statement

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported.

S. 1330, as reported, would provide additional authorities to DOC and NIST regarding manufacturing technology development and deployment and would provide authorization of appropriations to NIST for its manufacturing technology programs for FY 1993, 1994, and 1995.

The bill confers no new regulatory authority on NIST, the Technology Administration, or any other unit of DOC. Implementation of the legislation will not increase Federal regulation of any individuals or businesses, and thus in this respect will not result in increased Federal regulation, economic effect, impact on personal privacy, or additional paperwork. The Secretary will make decisions regarding applications for financial assistance under the ATP and other NIST technology programs and will require applicants to submit certain information. However, all such business relationships will be voluntary.

In terms of paperwork, the bill requires a one-time report from the commission established under section 5 of the reported bill and annual reports from the Secretary on international negotiations which potentially could affect Federal R&D programs.

Section-by-Section Analysis

SECTION 1.—SHORT TITLE

This section states that this legislation may be cited as the "Manufacturing Strategy Act of 1991."

SECTION 2.—FINDINGS AND PURPOSE

Subsection (a) presents findings. Congress finds and declares the following.

(1) The development and deployment of advanced manufacturing technologies and other process technologies are vital to the Nation's economic growth, standard of living, competitiveness in world markets, and national security.

(2) New developments in flexible computer-integrated manufacturing, electronic manufacturing networks, and other new technologies make possible dramatic improvements across all industrial sectors in productivity, quality, and the speed with which manufacturers can respond to customers and changing market opportunities.

(3) The United States currently leads the world in research on advanced manufacturing technologies, but often lags behind other nations in the full development, deployment, and use of these new technologies.

(4) Among the steps necessary for the United States to reap the full benefits of advanced manufacturing technology are further research and development activities; testbed projects to

test and validate new technology; programs to accelerate the deployment of both new advanced technologies and valuable off-the-shelf equipment; full development of digital product data technology; enhanced transfer of federally funded technology to industry; and increased cooperation among the Federal Government, industry, labor organizations, and the States.

(5) DOC, in cooperation with DOD and other Federal agencies, has played and can continue to play an important role in assisting U.S. industry to develop, test, and deploy advanced manufacturing technologies.

Subsection (b) of the reported bill states that it is the purpose of Congress in this legislation to enhance the ability of DOC's technology programs to assist the efforts of private industry in manufacturing and, in the process, to help ensure the continued leadership of the United States in advanced manufacturing technologies.

SECTION 3.—AMENDMENT TO THE STEVENSON-WYDLER TECHNOLOGY INNOVATION ACT

This section amends the Stevenson-Wydler Act (15 U.S.C. 3701 et seq.) by adding a new title III, entitled "Manufacturing Technology." The new title includes six new sections.

New section 301 presents a statement of policy and purpose. Under subsection (a) of the new section, Congress declares that:

(1) Federal agencies, particularly DOC, shall work with industry to ensure that within 10 years of the date of enactment of this title the United States is second to no other nation in the development, deployment, and use of advanced manufacturing technology;

(2) because of the importance of manufacturing and advanced manufacturing technology to the Nation's economic prosperity and defense, all the major Federal research and development agencies shall place a high priority on the development and deployment of advanced manufacturing technologies, and shall work closely with U.S. industry to develop and test those technologies; and

(3) DOC, particularly the Technology Administration, shall serve as the lead civilian agency for promoting the development and deployment of advanced manufacturing technology, and other Federal departments and agencies which work with civilian industry shall be encouraged, as appropriate, to work through DOC's programs.

New section 301(b) states that it is the purpose of Congress in this title to help ensure, through the programs and activities of DOC and other Federal agencies, continued U.S. leadership in the development and deployment of advanced manufacturing technologies and their applications.

New section 302 states DOC's role in manufacturing. Subsection (a) states that DOC shall be the lead civilian agency of the Federal Government for working with U.S. industry and labor to—

(1) develop new generic advanced manufacturing technologies; and

(2) encourage and assist the deployment and use of advanced manufacturing equipment and techniques throughout the United States.

New section 302(b) states that the Secretary, through the Under Secretary and the Director of NIST (Director) and, as appropriate, in coordination with the heads of other Federal agencies and with industry, shall design and manage programs that:

(A) identify technical, organizational, institutional, and informational barriers to the development, deployment, and use of advanced manufacturing equipment and technologies;

(B) accelerate the development of advanced manufacturing technologies in such areas as computer-integrated manufacturing, advanced robotics, concurrent engineering, enterprise integration, communications networks for manufacturing, other advanced process technologies, computer software, and quality assurance techniques;

(C) support projects, centers, and other mechanisms to help U.S. industry develop, test, and deploy advanced manufacturing and process technologies;

(D) assist U.S. industry to develop and disseminate generic manufacturing process models and related techniques, including expert systems and benefit/cost analyses, that significantly increase quality, productivity, and flexibility; expand and speed the use of the best current manufacturing practices, such as total quality management, concurrent engineering, and just-in-time delivery; and develop techniques which help companies define their manufacturing technology needs and select production equipment;

(E) increase coordination with industry for identifying the need for both interface and systems standards in manufacturing and, as appropriate, support testbeds so that industry can determine at early states whether new technologies and prototypes are compatible with new standards; and

(F) accelerate, in partnership with the States and industry, the broad deployment and adoption of advanced manufacturing technologies by medium and small, as well as large, manufacturers throughout the United States.

The Secretary, acting through the Under Secretary, also shall conduct analyses on how Federal policies and programs can better encourage private-sector efforts to develop, test, deploy, and use advanced manufacturing technologies; and shall work with the private sector as a catalyst to help develop new manufacturing business practices, teaching factories, shared manufacturing facilities, accounting standards, training methods, improved supplier-customer relations, and other steps which would accelerate the deployment and use of advanced manufacturing technologies by U.S. industry.

New section 302(c) states that the Secretary, Under Secretary, and Director, as appropriate, shall ensure that DOC advanced manufacturing technology activities are conducted in a manner consistent with any national advanced manufacturing technology development plans that may be developed by the President or the Director of the Office of Science and Technology Policy (OSTP).

New section 302(d) states that the Secretary and the Secretary of Defense shall coordinate their policies and programs to promote the development and deployment of advanced manufacturing technologies. The two Secretaries shall form, as appropriate, joint working groups or special project offices to coordinate their manufacturing activities.

The Committee notes that DOC and DOD have cooperated in a number of manufacturing-related activities, including the AMRF and RAMP projects. The Committee supports this cooperation and encourages the Secretary to continue to work closely with the Secretary of Defense, as appropriate, to pool their efforts and resources in the fields of manufacturing technology development and deployment.

New section 303 establishes the Project. Subsection (a) of this new section establishes the Project. The purpose of the Project is to create a collaborative multiyear technology development program involving NIST, U.S. industry, and, as appropriate, other Federal agencies and the States in order to develop, refine, test, and transfer advanced computer-integrated, electronically networked manufacturing technologies and associated applications.

New section 303(b) states that the Project shall have three components: an advanced manufacturing research and development activity at NIST; one of more technology development testbeds within the United States, selected through NIST's, whose purpose shall be to develop, refine, test, and transfer advanced manufacturing and networking technologies and associated applications; and one or more information dissemination contracts for the purpose of providing information and technical assistance regarding advanced manufacturing and networking technologies to small and medium-sized manufacturers.

The Committee notes that NIST has made and continues to make major contributions to generic manufacturing technology and associated support technologies through the AMRF and the new PDES Testbed. The Committee also notes that one purpose of the ATP is to assist "United States businesses in creating and applying the generic technology and research results necessary to * * * refine manufacturing technologies."

The goal of the Project is to link NIST's in-house manufacturing work and, as appropriate, other federally supported projects such as RAMP with expanded industry-led activities supported under NIST's ATP, in order to create a coordinated industry-led and government-assisted effort to develop, refine, test, and transfer new generic manufacturing systems for the Nation. To the maximum extent practical, the Project should seek to transfer to the private sector and then refine new manufacturing technologies already developed by NIST and, as appropriate, by other Federal agencies such as DOD. The emphasis should be on developing and testing prototype advanced computer-integrated, electronically networked technologies and systems that can be used in a wide range of manfacturing applications. The Project may include the testing and refinement of prototype equipment developed by participating companies, for the purpose of integrating that equipment into new generic manufacturing systems. The testbed or testbeds supported under the ATP portion of the Project could be physically located either at

NIST facilities or at other sites selected by the ATP award recipients. The Project includes information dissemination contracts in order to ensure that the results of the Project are shared widely with small and medium-sized manufacturers throughout the United States.

New section 303(c) states that the Project, under the coordination of the Director, shall undertake the following activities.

(1) test and, as appropriate, develop the equipment, computer software, and systems integration necessary for the successful operation within the United States of advanced manufacturing systems and associated electronic networks;

(2) establish, at NIST and at the technology development testbed or testbeds, prototype advanced computer-integrated manufacturing systems and prototype electronic networks linking the manufacturing systems;

(3) assist industry to implement voluntary consensus standards relevant to advanced computer-integrated manufacturing operations, including standards for integrated services digital networks, electronic data interchange, and digital product data specifications;

(4) help to make high-performance computing and networking technologies an integral part of design and production processes;

(5) conduct research to identify and overcome technical barriers to the successful and cost-effective operation of advanced manufacturing systems and networks;

(6) facilitate industry efforts to develop and test new applications for manufacturing systems and networks;

(7) involve, to the maximum extent practicable, both those U.S. companies which make manufacturing and computer equipment and those companies which buy the equipment, with particular emphases on including a broad range of company personnel in the Project and on assisting small and medium-sized manufacturers;

(8) train, as appropriate, company managers, engineers, and employees in the operation and applications of advanced manufacturing technologies and networks, with a particular emphasis on training production workers in the effective use of new technologies and thereby expanding the skill base of the workforce and increasing production flexibility and adaptability;

(9) work with private industry to develop standards for the use of advanced computer-based training systems, including multimedia and interactive learning technologies; and

(10) exchange information and personnel, as appropriate, between the technology development testbeds and NIST's MTCs.

New section 303(d) states that, in selecting applicants to receive testbed awards, the Secretary shall give particular consideration to applicants that have existing expertise with digital data product technologies and, in the case of joint research and development ventures, to those joint ventures which include both suppliers and users of advanced manufacturing equipment. An industry-led joint research and development venture applying for a testbed award

may include one or more State research organizations, universities, independent research organizations, or MTCs.

New section 303(e) states that the Project shall be considered one of DOC's activities under the Federal high-performance computing program and shall be considered a "Grand Challenge," as that term is defined under that program. The Project shall remain under the jurisdiction of the Secretary, although the Secretary, as appropriate, may invite the participation of other Federal departments and agencies. The Secretary and Director, in consultation with the OSTP Director, as appropriate, shall direct that the Project conduct manufacturing networking experiments in partnership with the operators of the National Research and Education Network.

The Committee notes that one of the three central goals of the Administration's HPPC initiative is to "[S]pur gains in U.S. productivity and industrial competitiveness by making high performance computing and networking technologies an integral part of the design and production process" (from the Office of Management and Budget booklet describing the HPCC). The Committee supports this goal, notes that currently there is no major executive branch effort in this area, and believes that DOC, in close cooperation with DOD, is the appropriate civilian agency to lead such an effort.

New section 303(f) states that within 6 months after the date of enactment of this title, and before any request for proposals is issued, the Secretary, through the Under Secretary and Director, shall hold one or more workshops to solicit advice from U.S. industry and from other Federal departments, particularly DOD, regarding the specific missions and activities of the testbeds. The Secretary may request and accept funds, facilities, equipment, or personnel from other Federal departments and agencies in order to carry out responsibilities under this section.

New section 304 deals with activities by agencies other than DOC in support of industry-led research in manufacturing and process technology. Subsection (a) states that it shall be a mission of all Federal research and development agencies to support the national technology base upon which both the Federal Government and U.S. industry draw. Moreover, in order to contribute to the national technology base, each Federal department and agency is authorized and encourage to provide support for industry-led technology development projects whose purpose is the development of critical generic technologies, particularly manufacturing and processing technologies, which are identified in the biennial critical technologies reports prepared by the National Critical Technologies Panel. New section 304(b) states that each Federal department and agency may support—industry-led technology development projects by either using or establishing its own program or programs to support industry-led technology development projects, or channeling its funds to support industry-led technology development projects through DOC's ATP.

The Committee believes that each Federal R&D agency should contribute to the national technology base upon which it draws, especially since the Federal Government is increasingly dependent on new technologies developed by commercial industry. Furthermore, financial support for industry-led R&D, in which industry

proposes specific projects to advance the development of generic technologies, is an appropriate mechanism for supporting the national technology base. In order to avoid unnecessary duplication and administrative expense in operating agency programs to support industry-led R&D, the Committee encourages agencies to work, when appropriate, through NIST's ATP.

New section 305 establishes NIST fellowships in manufacturing engineering. Subsection (a) states that the Under Secretary and the Director, in consultation with other appropriate Federal officials, shall establish a program to provide fellowships to graduate students at institutions of higher education within the United States who choose to pursue masters or doctoral degrees in manufacturing engineering. The purpose of the program is to encourage larger numbers of highly qualified graduate students to enter manufacturing engineering and thereby help improve manufacturing within the United States. Such fellowships shall be awarded through a competitive, merit-based selection process. In order to be eligible to receive one of the graduate fellowships established by this subsection, a student must attend or be admitted to a university graduate program which has been certified by the Director as meeting the following criteria: at least several manufacturing companies have a continuing relationship with the program; the program has at least several faculty members with expertise in manufacturing; and the program encourages its graduate students to acquire experience in industry before enrolling for graduate study.

New section 305(b) establishes a manufacturing managers fellowship program. The Under Secretary and the Director also shall establish a program to provide fellowships, on a matching funds basis, to industrial executives with experience in manufacturing to serve for 1 or 2 years as instructors in manufacturing at 2-year community and technical colleges in the United States. Fellowships shall be made through a competitive, merit-based process. In selecting fellows, the Under Secretary and the Director shall place special emphasis on supporting individuals who not only have expertise and practical experience in manufacturing but also can serve as bridges between 2-year colleges and manufacturing firms in their areas.

New section 306 establishes a National Quality Laboratory. Subsection (a) states that there is established, within NIST, the Laboratory, the purpose of which is to serve as a mechanism by which U.S. companies can work together to advance quality management programs. The Director, under appropriate contractual arrangements, may select one or more managers to operate such Laboratory activities as the Director deems appropriate, selecting such manager or managers from among individuals or broad-based nonprofit entities which are leaders in the field of quality management and which have a history of service to society.

The Committee intends that the Laboratory shall be a part of NIST, but also that the Director shall have the flexibility to contract with one or more managers to operate such Laboratory activities as the Director deems appropriate. Also, the Committee does not intend that the requirement that the manager or managers be selected from among individuals or broad-based nonprofit entities should exclude from consideration retired business leaders who

were active in promoting quality programs in their former companies.

New section 306(b) states that the Laboratory shall—

(1) provide technical services to manufacturing companies, service companies, and other organizations in the United States to help them improve the quality of the operations and products;

(2) conduct research and analyses on ways to improve quality; and

(3) facilitate and assist voluntary efforts by leaders from business, labor, and education to—

(A) harmonize quality initiatives underway in given industrial sectors;

(B) train individuals and organizations in the methods and criteria of the Malcolm Baldrige National Quality Award established under section 107 of the Stevenson-Wydler Act;

(C) encourage and aid the creation and operation of State quality councils or institutes;

(D) develop model criteria and materials, and, as appropriate, conduct workshops to provide employees with the education and training necessary to operate within quality management programs; and

(E) in general assist in the broad dissemination of best practices available in total quality management, including the practices and quality improvement strategies successfully employed by those firms which have won the Malcolm Baldrige National Quality Award, as well as best practices in the fields of lean production, market-driven product improvement, and customer-supplier relations.

The Committee intends that the Laboratory serve as a forum for voluntary private-sector activities in the field of quality management. The Laboratory also is authorized to provide services to industry, on a cost-recovery, market-rate basis, just as other parts of NIST provide technical services and data to industry. Such services by the Laboratory may include training. The Laboratory also should serve as one point of access in NIST for firms and other organizations interested in how NIST's overall services can help improve quality. The Laboratory, as appropriate, should conduct research and analyses that will help it better perform its tasks.

New section 306(c) states that the secretary and the Director are authorized to use appropriated funds to assist the operations of the Laboratory. The Secretary and the Director also are authorized to seek and accept gifts from public and private sources to help fund the activities of the Laboratory.

The Committee intends that NIST be able to accept private as well as public gifts to support the Laboratory. However, in order to avoid any appearance of a conflict of interest, the Committee directs the Secretary and the Director to avoid accepting gifts from companies or other organizations that are applying for the Baldrige Award. In addition, private gifts to support the activities of the Laboratory should be kept separate from funds used to manage and operate the Baldrige Award Program. The Secretary and the

Director are authorized to accept donations of volunteer time as well as financial and in-kind contributions.

SECTION 4.—TECHNOLOGY EXTENSION AND DEPLOYMENT ACTIVITIES OF THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Subsection (a) makes certain conforming amendments to section 25 of the Act of March 3, 1901 (NIST Act); strikes subsection (d) of that section; and adds new subsections (d) and (e).

New subsection (d) of section 25 states that if an MTC receives a positive evaluation during its third year of operation, the Director, any time after that evaluation, may contract with the MTC to provide additional technology extension or transfer services above and beyond the baseline activities of the MTC. Such additional services may include, but are not necessarily limited to, the development and operation of prototype regional teleconferencing and digital communications networks; programs to assist small- and medium-sized manufacturers and their employees in the MTC's region to learn and apply the technologies and techniques associated with systems management technology; and programs focused on the testing, development, and application of manufacturing and process technologies within specific technical fields such as advanced materials, electronics fabrication, or general manufacturing, for the purpose of assisting U.S. companies, both large and small and both within the MTC's original service region and in other regions, to improve manufacturing, product design, workforce training, and production in those specific technical fields.

The Committee notes that under section 25 of the NIST Act, an MTC is to receive a maximum of 6 years of Federal funding for center operations. The Committee does not recommend changing this 6-year limitation for the support of baseline center operations. However, in addition to these baseline activities, the MTCs may be an effective mechanism for providing additional technology extension services to small manufacturers. Therefore, the reported bill provides that MTCs shall be eligible to receive NIST contracts for providing services above and beyond their baseline activities.

New subsection (e) of section 25 states that in addition to any assistance provided or contracts entered into with an MTC under this section, the Director is authorized to make separate and smaller awards, through a competitive process, to nonprofit organizations that wish to work with an MTC to enable those organizations to provide additional outreach services, in collaboration with the MTC, to small and medium-sized manufacturers. Organizations which receive such awards shall be known as Satellite Manufacturing Centers. In reviewing applications, the Director shall consider the needs of rural as well as urban manufacturers. No single award for a Satellite Manufacturing Center shall be for more than 3 years; awards shall be renewable through the competitive awards process; and no award shall be made unless the applicant provides matching funds at least equal to the amount requested from the Director.

The Committee notes that many manufacturing extension programs exist throughout the country at 2-year colleges and other organizations. With small matching grants from NIST, these existing

programs would be a cost-effective means for sharing expertise and technology from NIST's MTCs with a much larger number of small manufacturers than the MTCs can reach directly. Therefore, new subsection 25(e) provides for support for Satellite manufacturing Centers.

As in the case of the MTCs, the purpose of the Satellite Manufacturing Centers is to provide information and technical assistance to small- and medium-sized manufacturers in the United States. They also are to transfer to these firms NIST technology and expertise, ranging from NIST expertise in the off-the-shelf manufacturing technologies used in NIST's Shop of the 1990s Project to the more advanced technologies of the AMRF.

Section 4(b) of the reported bill makes certain conforming amendments to section 26 of the NIST Act and adds a new subsection (c) to that section. This new subsection states that in addition to the general authorities listed in subsection (b) of section 26, the STEP also shall, through merit-based competitive review processes and as authorizations and appropriations permit—

(A) make awards to States and conduct workshops, pursuant to section 5121(b) of the Omnibus Trade and Competitiveness Act of 1988, in order to help States improve their planning and coordination of technology extension activities;

(B) support industrial modernization demonstration projects to help States create networks among small manufacturers for the purpose of facilitating technical assistance, group services, and improved productivity and competitiveness;

(C) support State efforts to develop and test innovative ways to help small- and medium-sized manufacturers improve their technical capabilities, including innovative methods for transferring Federal technology, for encouraging business networks and shared facilities among small manufacturers, for expanding the skill of the workforce, for identifying new manufacturing opportunities between small and large firms, and for working with the States and, as appropriate, private information companies, to provide small- and medium-sized firms with access to data bases and technical experts;

(D) support cooperative research and technology assistance projects between NIST and the States, particularly projects, funded on a matching basis, to help firms within the States to improve their manufacturing and process technologies, including manufacturing education institutes; and

(E) as appropriate, promote the creation of industry-led State quality laboratories or institutes affiliated with the National Quality Laboratory established by section 307 of the Stevenson-Wydler Act.

Each application for financial assistance under this new subsection shall demonstrate a commitment to derive at least 50 percent of the resources necessary to defray the total cost of the program from non-Federal Government sources, unless the Secretary, acting through the Director, determines that a State government lacks the required resources due to chronic financial difficulties.

SECTION 5.—NATIONAL MANUFACTURING TECHNOLOGY ADVISORY COMMISSION

Subsection (a) establishes the (Commission), for the purpose of examining what steps must be taken by industry and government to ensure that within a decade the United States has a modern industrial infrastructure, including research and development capabilities and equipment and facilities, second to no other nation.

Subsection (b) states that the Commission shall address, but not necessarily limit itself to, the following issues.

(1) What range of factors affect how willing and able U.S. companies are to invest in new research, product development, and equipment and facilities, and how do those factors compare with conditions in other major industrialized countries?

(2) How do the cost, availability, and long-term or short-term orientation of capital in the United States affect the ability of companies to make investments and modernize industrial equipment and facilities?

(3) What are the particular industrial modernization problems, including capital problems, insufficient information, and workforce training needs faced by small- and medium-sized manufacturing firms in the United States?

(4) How feasible and appropriate would it be to create a privately sponsored or government sponsored enterprise which would serve as a secondary market for private loans for the purchase or lease of advanced manufacturing technology by small- and medium-sized manufacturers within the United States, and could an insurance premium provision be built into such an enterprise to ensure that a sufficient financial reserve would exist to cover any losses incurred by the enterprise?

(5) In general, what steps could the Federal Government, the States, and the private sector take to accelerate the modernization of U.S. industry, particularly manufacturing firms?

Subsection (c) states that the Commission shall be composed of 12 members, none of whom shall serve as full-time Federal employees during their term of service on the Commission, who are eminent in such fields as advanced technology, manufacturing, finance, and international economics and who are appointed as follows:

(A) four individuals shall be appointed by the President, one of whom shall be designated by the President to chair the Commission;

(B) four individuals shall be appointed by the Speaker of the House of Representatives, one of whom shall be appointed upon the recommendation of the minority leader of the House of Representatives; and

(C) four individuals shall be appointed by the President pro tempore of the Senate, three of whom shall be appointed upon the recommendation of the majority leader of the Senate and one of whom shall be appointed upon the recommendation of the minority leader of the Senate.

Each member shall be appointed, within 60 days after the date of enactment of this legislation, for the life of the Commission. A vacancy in the Commission shall be filled in the manner in which the original appointment was made.

Subsection (d) states that the chairperson shall call the first meeting of the Commission within 90 days after the date of enactment of this legislation. Recommendations of the Commission shall require the approval of two-thirds of the members of the Commission. The Commission may use such personnel detailed from Federal agencies, particularly from DOC, as may be necessary to enable the Commission to carry out its duties. Members of the Commission, while attending meetings of the Commission while away from their homes or regular places of business, shall be allowed travel expenses in accordance with subchapter I of chapter 57 of title 5, U.S. Code.

Subsection (e) states that the Commission shall, within 1 year after the date of enactment of this legislation, submit to the President and Congress a report containing legislative and other recommendations with respect to the issues addressed under subsection (b). Subsection (f) states that the Commission shall terminate 6 months after the submission of its report under subsection (e). Subsection (g) authorizes to be appropriated to carry out this section such sums as may be necessary for FY 1993 and 1994.

SECTION 6.—ANNUAL REPORT ON NEGOTIATIONS POTENTIALLY AFFECTING FEDERAL RESEARCH AND DEVELOPMENT PROGRAMS

This section states that the Secretary, after consultation with the OSTP Director, shall report annually to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives on any current or planned executive branch positions in international negotiations, including negotiations regarding subsidies or government procurement, which would affect the activities, funding levels, or eligibility requirements of Federal domestic research and development programs.

The Committee notes that trade negotiations and other international negotiations, including those regarding science and technology, increasingly include discussions of domestic R&D programs and other national programs to promote economic competitiveness. In order to facilitate greater mutual understanding on these matters between executive branch officials and congressional science and technology committees, section 6 of the reported bill directs the Secretary to submit annual reports on this subject.

SECTION 7.—AUTHORIZATION OF APPROPRIATIONS

Subsection (a) states that of the amounts otherwise authorized to be appropriated to the Secretary for FY 1993—

(1) $10,000,000 of the amounts authorized for NIST's Manufacturing Engineering Laboratory are authorized only for carrying out NIST's internal portion of the Project established under section 303 of the Stevenson-Wydler Act (as amended by this legislation);

(2) $30,000,000 of the amounts authorized for NIST's ATP are authorized only for support of the Project; and

(3) $5,000,000 of the amounts authorized for NIST's MTCs are authorized only for support of Satellite Manufacturing Centers.

Subsection (b) provides additional authorizations. In addition to such other sums as may be authorized to be appropriated to the Secretary and the Director by this or any other Act, there are authorized to be appropriated to the Secretary and the Director—

(1) to carry out responsibilities under section 303 of the Stevenson-Wydler Act (as amended by this legislation), $50,000,000 for FY 1994 and $40,000,000 for FY 1995;

(2) to carry out responsibilities under section 305 of the Stevenson-Wydler Act (as amended by this legislation), $5,000,000 for FY 1993, $30,000,000 for FY 1994, and $30,000,000 for FY 1995;

(3) to carry out responsibilities under section 306 of the Stevenson-Wydler Act (as amended by this legislation), $5,000,000 for FY 1993, $5,000,000 for FY 1994, and $5,000,000 for FY 1995; and

(4) to carry out responsibilities under subsections (d) and (e) of section 25 of the NIST Act (as amended by this legislation), $60,000,000 for FY 1994 and $50,000,000 for FY 1995.

SECTION 8.—MISCELLANEOUS AND CONFORMING AMENDMENTS

Subsection (a) adds the following definitions to section 4 of the Stevenson-Wydler Act:

- "Director" means the Director of NIST;
- "Institute" means NIST;
- "Assistant Secretary" means the Assistant Secretary of Commerce for Technology Policy;
- "Advanced manufacturing technology" means—

(A) numerically controlled machine tools, robots, automated process control equipment, computerized flexible manufacturing systems, associated computer software, and other technology for improving manufacturing and industrial production; and

(B) techniques and processes designed to improve manufacturing quality, productivity, and practices, including quality assurance, concurrent engineering, shop floor management, inventory management, and upgrading of worker skills.

Subsection (b) redesignates existing sections of the Stevenson-Wydler Act and makes certain other conforming changes. It also states that in addition to the technology transfer mechanisms set forth in the Stevenson-Wydler Act, the heads of Federal departments and agencies also may transfer technologies through the technology transfer, extension, and deployment programs of DOC and DOD.

The existing Stevenson-Wydler Act covers two distinct subjects, DOC's technology activities and related technology programs, and Federal technology transfer policy. To improve the organization of the statute, the existent provisions should be divided into two titles. The manufacturing provisions recommended in section 3 of S. 1330 as reported would become the third title of the Stevenson-Wydler Act.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new material is printed in italic, existing law in which no change is proposed is shown in roman):

STEVENSON-WYDLER TECHNOLOGY INNOVATION ACT OF 1980

SECTION 1 THROUGH SEC. 3 * * *

SEC. 4. DEFINITIONS.

As used in this Act, unless the context otherwise requires, the term—

(1) "Office" means the Office of Technology Policy established under [section 5] *section 101* of this Act.

(2) * * *

(3) "Under Secretary" means the Under Secretary of Commerce for Technology appointed under [section 5] *section 101*(b)(1).

(4) "Centers" means the Cooperative Research Centers established under [section 6] *section 103* or [section 8] *section 105* of this Act.

(5) * * *

(6) "Federal laboratory" means any laboratory, any federally funded research and development center, or any center established under [section 6] *section 103* or [section 8] *section 105* of this Act that is owned, leased, or otherwise used by a Federal agency and funded by the Federal Government, whether operated by the Government or by a contractor.

(7) through (12) * * *

(13) "Clearinghouse" means the Clearinghouse for State and Local Initiatives on Productivity, Technology, and Innovation established by [section 6] *section 102.*

(14) "Director" means the Director of the National Institute of Standards and Technology.

(15) "Institute" means the National Institute of Standards and Technology.

(16) "Assistant Secretary" means the Assistant Secretary of Commerce for Technology Policy.

(17) "Advanced manufacturing technology" means—

(A) numerically-controlled machine tools, robots, automated process control equipment, computerized flexible manufacturing systems, associated computer software, and other technology for improving manufacturing and industrial production; and

(B) techniques and processes designed to improve manufacturing quality, productivity, and practices, including quality assurance, concurrent engineering, shop floor management, inventory management, and upgrading worker skills.

TITLE I—DEPARTMENT OF COMMERCE AND RELATED PROGRAMS

SEC. [5.] *101.* COMMERCE AND TECHNOLOGICAL INNOVATION.

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SEC. [6.] *102.* CLEARINGHOUSE FOR STATE AND LOCAL INITIATIVES ON PRODUCTIVITY, TECHNOLOGY, AND INNOVATION.

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SEC. [7.] *103.* CENTERS FOR INDUSTRIAL TECHNOLOGY.

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SEC. [8.] *104.* GRANTS AND COOPERATIVE AGREEMENTS.

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SEC. [9.] *105.* NATIONAL SCIENCE FOUNDATION COOPERATIVE RESEARCH CENTERS.

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SEC. [10.] *106.* ADMINISTRATIVE ARRANGEMENTS.

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SEC. [16.] *107.* NATIONAL TECHNOLOGY MEDAL.

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SEC. [17.] *108.* MALCOLM BALDRIGE NATIONAL QUALITY AWARD.

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SEC. [18.] *109.* PERSONNEL EXCHANGES.

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[SEC. 19. AUTHORIZATION OF APPROPRIATIONS.

[(a)(1) There is authorized to be appropriated to the Secretary for the purposes of carrying out sections 5, 11(g), and 16 of this Act not to exceed $3,400,000 for the fiscal year ending September 30, 1988.

[(2) Of the amount authorized under paragraph (1) of this subsection, $2,400,000 is authorized only for the Office of Productivity, Technology, and Innovation, $500,000 is authorized only for the purpose of carrying out the requirements of the Japanese technical literature program established under section 5(d) of this Act; and $500,000 is authorized only for the patent licensing activities of the National Technical Information Service.

[(b) In addition to the authorization of appropriations provided under subsection (a) of this section, there is authorized to be appropriated to the Secretary for the purposes of carrying out section 6 of this Act not to exceed $500,000 for the fiscal year ending September 30, 1988, $1,000,000 for the fiscal year ending September 30, 1989, and $1,500,000 for the fiscal year ending September 30, 1990.

[(c) Such sums as may be appropriated under subsection (a) and (b) shall remain available until expended.

[(d) To enable the National Science Foundation to carry out its powers and duties under this Act only such sums may be appropriated as the Congress may authorize by law.]

SEC. [20.] *110.* SPENDING AUTHORITY.

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TITLE II—FEDERAL TECHNOLOGY TRANSFER

SEC. [11.] *201.* UTILIZATION OF FEDERAL TECHNOLOGY.

(a) through (g) * * *

(h) ADDITIONAL TECHNOLOGY TRANSFER MECHANISMS.—In addition to the technology transfer mechanisms set forth in this section and section 202 of this Act, the heads of Federal departments and agencies also may transfer technologies through the technology transfer, extension, and deployment programs of the Department of Commerce and the Department of Defense.

SEC. [12.] *202.* COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS.

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SEC. [13.] *203.* REWARDS FOR SCIENTIFIC, ENGINEERING, AND TECHNICAL PERSONNEL OF FEDERAL AGENCIES.

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SEC. [14.] *204.* DISTRIBUTION OF ROYALTIES RECEIVED BY FEDERAL AGENCIES.

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SEC. [15.] *205.* EMPLOYEE ACTIVITIES.

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SEC. [21.] *206.* USE OF PARTNERSHIP INTERMEDIARIES.

(a) AUTHORITY.—Subject to the approval of the Secretary or head of the affected department or agency, the Director of a Federal laboratory, or in the case of a federally funded research and development center, the Federal employee who is the contract officer, may—

(1) enter into a contract or memorandum of understanding with a partnership intermediary to perform services for the Federal laboratory that increase the likelihood of success in the conduct of cooperative or joint activities of such Federal laboratory with small business firms; and

(2) pay the Federal costs of such contract or memorandum of understanding out of funds available for the support of the technology transfer function pursuant to [section 11(b)] *section 201(b)* of this Act.

(b) PARTNERSHIP PROGRESS REPORTS.—The Secretary shall include in each triennial report required under [section 6(b)] *section 102(d)* of this Act a discussion and evaluation of the activities carried out pursuant to this section during the period covered by the report.

(c) DEFINITION.—For purposes of this section, the term "partnership intermediary" means an agency of a State or local government, or a nonprofit entity owned in whole or in part by, chartered by, funded in whole or in part by, or operated in whole or in part by or on behalf of a State or local government, that assists, coun-

sels, advises, evaluates, or otherwise cooperates with small business firms that need or can make demonstrably productive use of technology-related assistance from a federal laboratory, including State programs receiving funds under cooperative agreements entered into under section 5121(b) of the Omnibus Trade and Competitiveness Act of 1988 (15 U.S.C. 2781 note).

TITLE III—MANUFACTURING TECHNOLOGY

SEC. 301. STATEMENT OF POLICY AND PURPOSE.

(a) STATEMENT OF POLICY.—Congress declares that it is the policy of the United States that—

(1) Federal agencies, particularly the Department of Commerce, shall work with industry to ensure that within 10 years of the date of enactment of this title the United States is second to no other nation in the development, deployment, and use of advanced manufacturing technology;

(2) because of the importance of manufacturing and advanced manufacturing technology to the Nation's economic prosperity and defense, all the major Federal research and development agencies shall place a high priority on the development and deployment of advanced manufacturing technologies, and shall work closely with United States industry to develop and test those technologies; and

(3) the Department of Commerce, particularly the Technology Administration, shall serve as the lead civilian agency for promoting the development and deployment of advanced manufacturing technology, and deployment of advanced manufacturing technology, and other Federal departments and agencies which work with civilian industry shall be encouraged, as appropriate, to work through the programs of the Department of Commerce.

(b) PURPOSE.—It is the purpose of Congress in this title to help ensure, through the programs and activities of the Department of Commerce and other Federal agencies, continued United States leadership in the development and deployment of advanced manufacturing technologies and their applications.

SEC. 302. ROLE OF THE DEPARTMENT OF COMMERCE.

(a) MISSION IN MANUFACTURING.—The Department of Commerce shall be the lead civilian agency of the Federal Government for working with United States industry and labor to—

(1) develop new generic advanced manufacturing technologies; and

(2) encourage and assist the deployment and use of advanced manufacturing equipment and techniques throughout the United States.

(b) DUTIES.—(1) The Secretary shall, through the Under Secretary and the Director and, as appropriate, in coordination with the heads of other Federal agencies and with industry, design and manage programs that—

(A) identify technical, organizational, institutional, and informational barriers to the development, deployment, and use of advanced manufacturing equipment and technologies;

(B) accelerate the development of advanced manufacturing technologies in such areas as computer-integrated manufactur-

ing, advanced robotics, concurrent engineering, enterprise integration, communications networks for manufacturing, other advance process technologies, computer software, and quality assurance techniques;

(C) support projects, centers, and other mechanisms to help United States industry develop, test, and deploy advanced manufacturing and process technologies;

(D) assist United States industry to—

(i) develop and disseminate generic manufacturing process models and related techniques, including expert systems and benefit/cost analyses, that significantly increase quality, productivity, and flexibility;

(ii) expand and speed the use of the best current manufacturing practices, such as total quality management, concurrent engineering, and just-in-time delivery; and

(iii) develop techniques which help companies define their manufacturing technology needs and select production equipment;

(E) increase coordination with industry for identifying the need for both interface and systems standards in manufacturing and, as appropriate, support testbeds so that industry can determine at early stages whether new technologies and prototypes are compatible with new standards; and

(F) accelerate, in partnership with the States and industry, the broad deployment and adoption of advanced manufacturing technologies by medium and small, as well as large, manufacturers throughout the United States.

(2) The Secretary, acting through the Under Secretary, also shall—

(A) conduct analyses on how Federal policies and programs can better encourage private sector efforts to develop, test, deploy, and use advanced manufacturing technologies; and

(B) work with the private sector as a catalyst to help develop new manufacturing business practices, teaching factories, shared manufacturing facilities, accounting standards, training methods, improved supplier-customer relations, and other steps which would accelerate the deployment and use of advanced manufacturing technologies by United States industry.

(c) RELATION TO NATIONAL PLANS.—The Secretary, Under Secretary, and Director shall, as appropriate, ensure that Department of Commerce advanced manufacturing technology activities are conducted in a manner consistent with any national advanced manufacturing technology development plans that may be developed by the President or the Director of the Office of Science and Technology Policy.

(d) COORDINATION WITH OTHER AGENCIES.—The Secretary and the Secretary of Defense shall coordinate their policies and programs to promote the development and deployment of advanced manufacturing technologies. The two Secretaries shall, as appropriate, form joint working groups or special project offices to coordinate their manufacturing activities.

SEC. 303. ADVANCED MANUFACTURING SYSTEMS AND NETWORKING PROJECT.

(a) ESTABLISHMENT OF PROJECT.—(1) In addition to such technology development responsibilities as may be set forth in other Acts, the Secretary, through the Under Secretary and the Director, shall establish an Advanced Manufacturing Systems and Networking Project (hereafter in this title referred to as the "Project").

(2) The purpose of the Project is to create a collaborative multiyear technology development program involving the Institute, United States industry, and, as appropriate, other Federal agencies and the States in order to develop, refine, test, and transfer advanced computer-integrated, electronically-networked manufacturing technologies and associated applications.

(b) PROJECT COMPONENTS.—The Project shall include—

(1) an advanced manufacturing research and development activity at the Institute;

(2) one or more technology development testbeds within the United States, selected through the Advanced Technology Program established under section 28 of the Act of March 3, 1901 (15 U.S.C. 278n), whose purpose shall be to develop, refine, test, and transfer advanced manufacturing and networking technologies and associated applications; and

(3) one or more information dissemination contracts selected through the provisions of section 25(d) and (e) of the Act of March 3, 1901 (15 U.S.C. 278k(d) and (e)), for the purpose of providing information and technical assistance regarding advanced manufacturing and networking technologies to these small and medium-sized manufacturers.

(c) ACTIVITIES.—The Project shall, under the coordination of the Director, undertake the following activities:

(1) test and, as appropriate, develop the equipment, computer software, and systems integration necessary for the successful operation within the United States of advanced manufacturing systems and associated electronic networks;

(2) establish at the Institute and the technology development testbed or testbeds—

(A) prototype advanced computer-integrated manufacturing systems; and

(B) prototype electronic networks linking the manufacturing systems;

(3) assist industry to implement voluntary consensus standards relevant to advanced computer-integrated manufacturing operations, including standards for integrated services digital networks, electronic data interchange, and digital product data specifications;

(4) help to make high-performance computing and networking technologies an integral part of design and production processes;

(5) conduct research to identify and overcome technical barriers to the successful and cost-effective operation of advanced manufacturing systems and networks;

(6) facilitate industry efforts to develop and test new applications for manufacturing systems and networks;

(7) involve, to the maximum extent practicable, both those United States companies which make manufacturing and computer equipment and those companies which buy the equipment, with particular emphases on including a broad range of company personnel in the Project and on assisting small and medium-sized manufacturers;

(8) train, as appropriate, company managers, engineers, and employees in the operation and applications of advanced manufacturing technologies and networks, with a particular emphasis on training production workers in the effective use of new technologies and thereby expanding the skill base of the workforce and increasing production flexibility and adaptability;

(9) work with private industry to develop standards for the use of advanced computer-based training systems, including multi-media and interactive learning technologies; and

(10) exchange information and personnel, as appropriate, between the technology development testbeds and the Regional Centers for the Transfer of Manufacturing Technology created under section 25 of the Act of March 3, 1901 (15 U.S.C. 278k).

(d) TESTBED AWARDS.—(1) In selecting applicants to receive awards under subsection (b)(2) of this section, the Secretary shall give particular consideration to applicants that have existing expertise with digital data product technologies and that, in the case of joint research and development ventures, include both suppliers and users of advanced manufacturing equipment.

(2) an industry-led joint research and development venture applying for an award under subsection (b)(2) of this section may include one or more State research organizations, universities, independent research organizations, or Regional Centers for the Transfer of Manufacturing Technology (as created under section 25 of the Act of March 3, 1901).

(e) RELATIONSHIP TO HIGH-PERFORMANCE COMPUTING PROGRAM.—(1) The Project shall be considered one of the Department of Commerce's activities under the Federal high-performance computing program and shall be considered a "Grand Challenge", as that term is defined under that program. The Project shall remain under the jurisdiction of the Secretary, although the Secretary may, as appropriate, invite the participation of other Federal departments and agencies.

(2) The Secretary and Director, in consultation with the Director of the Office of Science and Technology Policy, shall, as appropriate, direct that the Project conduct manufacturing networking experiments in partnership with the operators of the National Research and Education Network.

(f) ADVICE AND ASSISTANCE.—(1) Within 6 months after the date of enactment of this title, and before any request for proposals is issued, the Secretary, through the Under Secretary and Director, shall hold one or more workshops to solicit advice from United States industry and from other Federal departments, particularly the Department of Defense, regarding the specific missions and activities of the testbeds.

(2) The Secretary may request and accept funds, facilities, equipment, or personnel from other Federal departments and agencies in order to carry out responsibilities under this section.

SEC. 304. OTHER AGENCY SUPPORT FOR INDUSTRY-LED RESEARCH IN MANUFACTURING AND PROCESS TECHNOLOGY.

(a) SUPPORT OF NATIONAL TECHNOLOGY BASE.—(1) It shall be a mission of all Federal research and development agencies to support the national technology base upon which both the Federal Government and United States industry draw.

(2) In order to contribute to the national technology base, each Federal department and agency is authorized and encouraged to provide support for industry-led technology development projects whose purpose is the development of critical generic technologies, particularly manufacturing and processing technologies, which are identified in the biennial critical technologies reports prepared pursuant to section 603 of the National Science and Technology Policy, Organization, and Priorities Act of 1976 (42 U.S.C. 6683).

(b) METHODS OF SUPPORT.—Each Federal department and agency may support industry-led technology development projects by either—

(1) using or establishing its own program or programs to support industry-led technology development projects; or

(2) channelling its funds to support industry-led technology development projects through the Advanced Technology Program established under section 28 of the Act of March 3, 1901 (15 U.S.C. 278n).

SEC. 305. INSTITUTE FELLOWSHIPS IN MANUFACTURING ENGINEERING.

(a) GRADUATE FELLOWSHIPS.—(1) The Under Secretary and Director, in consultation with other appropriate Federal officials, shall establish a program to provide fellowships to graduate students at institutions of higher education within the United States who choose to pursue masters or doctoral degrees in manufacturing engineering. The purpose of the program is to encourage larger numbers of highly-qualified graduate students to enter manufacturing engineering and thereby help improve manufacturing within the United States. Such fellowships shall be awarded through a competitive, merit-based selection process.

(2) In order to be eligible to receive one of the graduate fellowships established by this subsection, a student must attend or be admitted to a university graduate program which has been certified by the Director as meeting the following criteria:

(A) at least several manufacturing companies have a continuing relationship with the program;

(B) the program has at least several faculty members with expertise in manufacturing; and

(C) the program encourages its graduate students to acquire experience in industry before enrolling for graduate study.

(b) MANUFACTURING MANAGERS PROGRAM.—The Under Secretary and Director also shall establish a program to provide fellowships, on a matching funds basis, to industrial executives with experience in manufacturing to serve for one or two years as instructors in manufacturing at two-year community and technical colleges in the United States. Fellowships shall be made through a competitive, merit-based process. In selecting fellows, the Under Secretary and Director shall place special emphasis on supporting individuals who not only have expertise and practical experience in manufacturing

but who also can serve as bridges between two-year colleges and manufacturing firms in their areas.

SEC. 306. NATIONAL QUALITY LABORATORY.

(a) ESTABLISHMENT.—(1) There is established, within the Institute, a National Quality Laboratory (hereafter in this section referred to as the "Laboratory"), the purpose of which is to assist private sector quality efforts and to serve as a mechanism by which United States companies can work together to advance quality management programs.

(2) The Director may, under appropriate contractual arrangements, select one or more managers to operate such Laboratory activities as the Director deems appropriate, selecting such manager or managers from among individuals or broad-based nonprofit entities which are leaders in the field of quality management and which have a history of service to society.

(b) ACTIVITIES.—The Laboratory shall—

(1) provide technical services to manufacturing companies, service companies, and other organizations in the United States to help them improve the quality of their operations and products;

(2) conduct research and analyses on ways to improve quality; and

(3) facilitate and assist voluntary efforts by leaders from business, labor, and education to—

(A) harmonize quality initiatives underway in given industrial sectors;

(B) train individuals and organizations in the methods and criteria of the Malcolm Baldrige National Quality Award established under section 107 of this Act;

(C) encourage and aid the creation and operation of State quality councils or institutes;

(D) develop model criteria and materials, and, as appropriate, conduct workshops to provide employees with the education and training necessary to operate within quality management programs; and

(E) in general assist in the broad dissemination of best practices available in total quality management, including the practices and quality improvement strategies successfully employed by those firms which have won the Malcolm Baldrige National Quality Award, as well as best practices in the fields of lean production, market-driven product improvement, and customer-supplier relations.

(c) FUNDING.—The Secretary and the Director are authorized to use appropriated funds to support the operations of the Laboratory. The Secretary and the Director also are authorized to seek and accept gifts from public and private sources to help fund the activities of the Laboratory.

ACT OF MARCH 3, 1901

Section 25 of that Act

[REGIONAL CENTERS FOR THE TRANSFER OF MANUFACTURING TECHNOLOGY]

MANUFACTURING TECHNOLOGY CENTERS

SEC. 25. (a) * * *

(b) * * *

(c)(1) * * *

(2) through (4) * * *

(5) Each Center which receives financial assistance under this section shall be evaluated during its third year of operation by an evaluation panel appointed by the Secretary. Each such evaluation panel shall be composed of private experts, none of whom shall be connected with the involved Center, and Federal officials. An official of the Institute shall chair the panel. Each evaluation panel shall measure the involved Center's performance against the objectives specified in this section. The Secretary shall not provide funding for the fourth through the sixth years of such Center's operation unless the evaluation is positive. If the evaluation is positive, the Secretary may provide continued funding through the sixth year at declining levels, which are designed to ensure that the Center no longer needs financial support from the Institute by the seventh year. In no event shall funding for a Center be provided by the Department of Commerce after the sixth year of the operation of a Center, *except for contracts for such specific technology extension services as the Director may specify.*

(6) * * *

[(d) There are authorized to be appropriated for the purposes of carrying out this section, a combined total of not to exceed $40,000,000 for fiscal years 1989 and 1990. Such sums shall remain available until expended.]

(d) If a Center receives a positive evaluation during its third year of operation, the Director may, any time after that evaluation, contract with the Center to provide additional technology extension or transfer services above and beyond the baseline activities of the Center. Such additional services may include, but are not necessarily limited to, the development and operation of—

(1) prototype regional teleconferencing and digital communications networks for the purpose of expanding the number of States, companies, and employees which can receive a Center's baseline services;

(2) programs to assist small and medium-sized manufacturers and their employees in the Center's region to learn and apply the technologies and techniques associated with systems management technology; and

(3) programs focused on the testing, development, and application of manufacturing and process technologies within specific technical fields such as advanced materials, electronics fabrication, or general manufacturing, for the purpose of assisting United States companies, both large and small and both within the Center's original service region and in other regions, to im-

prove manufacturing, product design, workforce training, and production in those specific technical fields.

(e) In addition to any assistance provided or contracts entered into with a Center under this section, the Director is authorized to make separate and smaller awards, through a competitive process, to non-profit organizations which wish to work with a Center to enable those organizations to provide additional outreach services, in collaboration with the Center, to small and medium-sized manufacturers. Oganizations which receive such awards shall be known as Satellite Manufacturing Centers. In reviewing applications, the Directors shall consider the needs of rural as well as urban manufacturers. No single award for a Satellite Manufacturing Center shall be for more than three years, awards shall be renewable through the competitive awards process, and no award shall be made unless the applicant provides matching funds at least equal to the amount requested from the Director.

SECTION 26 OF THAT ACT

ASSISTANCE TO STATE TECHNOLOGY PROGRAMS

SEC. 26. (a) There is established within the Institute a State Technology Extension Program. In addition to the Centers program created under section 25, the Secretary, through the Director and, if appropriate, through other officials, shall provide technical assistance *through that Program* to State technology programs throughout the United States, in order to help those programs help businesses, particularly small- and medium-sized businesses, to enhance their competitiveness through the application of science and technology.

(b) * * *

(c)(1) In addition to the general authorities listed in subsection (b) of this section, the State Technology Extension Program also shall, through merit-based competitive review processes and as authorizations and appropriations permit—

(A) make awards to States and conduct workshops, pursuant to section 5121(b) of the Omnibus Trade and Competitiveness Act of 1988, in order to help States improve their planning and coordination of technology extension activities;

(B) support industrial modernization demonstration projects to help States create networks among small manufacturers for the purpose of facilitating technical assistance, group services, and improved productivity and competitiveness;

(C) support State efforts to develop and test innovative ways to help small- and medium-sized manufacturers improve their technical capabilities, including innovative methods for transferring Federal technology, for encouraging business networks and shared facilities among small manufacturers, for expanding the skill of the workforce, for identifying new manufacturing opportunities between small and large firms, and for working with the States and, as appropriate, private information companies, to provide small- and medium-sized firms with access to data bases and technical experts;

(D) support cooperative research and technology assistance projects between the Institute and the States, particularly

projects, funded on a matching basis, to help firms within the States to improve their manufacturing and process technologies, including manufacturing education institutes;

(E) as appropriate, promote the creation of industry-led State quality laboratories or institutes affiliated with the National Quality Laboratory established by section 307 of the Stevenson-Wydler Technology Innovation Act of 1980.

(2) Each application for financial assistance under this subsection shall demonstrate a commitment to derive at least 50 percent of the resources necessary to defray the total cost of the program from non-Federal Government sources, unless the Secretary, acting through the Director, determines that a State government lacks the required resources due to chronic financial difficulties.

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